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driver 630 is a string type, which is integrated with CPU function. A solar cell 600 is integrated on the substrate as a power source for the whole apparatus. Transmitting and receiving information to/from externals are performed by input/output sensors 610 (for example LED and photodiode) integrated on the substrate. In accordance with the present embodiment, many members, such as the electric power source, the back light, the substrate mounting the control circuits, FPC, and container, can be omitted, and accordingly, the apparatus can be reduced in weight, in size, and in thickness. The portability of the information processor can be improved remarkably. As a similar embodiment, an example which uses a string driver and mounts a CPU630 on the substrate is shown in FIG. 16. FIG. 15 shows an example wherein all elements are integrated on the substrate. In both cases, the portability of the apparatus can be improved remarkably.

As described above, in accordance with the present invention, the active matrix liquid crystal display apparatus can be reduced in size, and the portability of the liquid crystal display apparatus can be improved.

What is claimed is:

1. A liquid crystal display apparatus, comprising:
  - a pair of substrates, at least one of which is transparent;
  - a liquid crystal layer formed by enclosing a liquid crystal composition between said pair of substrates;
  - a display region having a plurality of first semiconductor elements which are arranged in a matrix on one substrate of said pair of substrates;
  - peripheral circuits having a plurality of second semiconductor elements for driving said plurality of first semiconductor elements, arranged at a periphery of said display region, said peripheral circuits are formed on said one substrate of said pair of substrates and at least a part of said peripheral circuit are arranged in a peripheral circuits region which is held between said pair of substrates; and
  - at least one driver circuit which is an integrated circuit for driving said peripheral circuits is formed on said one substrate of said pair of substrates in a driver integrated circuit region which is not held between said pair of substrates.
2. A liquid crystal display apparatus as claimed in claim 1, wherein said first and second semiconductor elements are thin film transistors.
3. A liquid crystal display apparatus as claimed in claim 2, wherein
  - said thin film transistors at the display region have a mobility in a range of  $1 \text{ cm}^2/\text{Vs}$  to  $5 \text{ cm}^2/\text{Vs}$ ;
  - said thin film transistors at the peripheral circuits region have a mobility in a range from  $10 \text{ cm}^2/\text{Vs}$  to  $30 \text{ cm}^2/\text{Vs}$ ; and
  - the amplitude of a liquid crystal driving voltage of the driver circuit is at most 5 V.
4. A liquid crystal display apparatus as claimed in claim 2, wherein
  - said thin film transistors at the display region have a mobility in a range of  $0.7 \text{ cm}^2/\text{Vs}$  to  $5 \text{ cm}^2/\text{Vs}$ ;
  - said thin film transistors at the peripheral circuits region have a mobility in a range from  $30 \text{ cm}^2/\text{Vs}$  to  $100 \text{ cm}^2/\text{Vs}$ ; and
  - the amplitude of a liquid crystal driving voltage of the driver circuit is at most 5 V.
5. A liquid crystal display apparatus as claimed in claim 2, wherein

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- said thin film transistors at the display region have a mobility in a range of  $0.4 \text{ cm}^2/\text{Vs}$  to  $5 \text{ cm}^2/\text{Vs}$ ;
  - said thin film transistors at the peripheral circuits region have a mobility in a range from  $100 \text{ cm}^2/\text{Vs}$  to  $300 \text{ cm}^2/\text{Vs}$ ;
  - the amplitude of a liquid crystal driving voltage of the driver circuit is at most 5 V; and
  - a softening point of said one substrate of said pair of substrates is at most  $600^\circ \text{C}$ .
6. A liquid crystal display apparatus as claimed in claim 2, wherein
    - the thin film transistors at said display region have a switching time in a range from  $30 \mu\text{s}$  to  $60 \mu\text{s}$ ;
    - the thin film transistors at said peripheral circuit region have a switching time in a range of  $3 \mu\text{s}$  to  $12 \mu\text{s}$ ; and
    - said driver circuit has a transistor having a switching time in a range from  $0.01 \mu\text{s}$  to  $0.03 \mu\text{s}$ .
  7. A liquid crystal display apparatus as claimed in either of claim 1 or claim 2, wherein
    - said driver is bonded directly to said one substrate of said pair of substrates.
  8. A liquid crystal display apparatus as claimed in claim 1, wherein
    - said pair of substrates are made of glass.
  9. A liquid crystal display apparatus as claimed in claim 8, wherein
    - said driver is bonded to said one substrate of said pair of substrates by a COG (chip on glass) method.
  10. A liquid crystal display apparatus as claimed in claim 1, wherein
    - the number of driver circuits bonded to said one substrate of said pair of substrates is one.
  11. A liquid crystal display apparatus as claimed in claim 1, wherein
    - said peripheral circuits region comprises:
      - a signal circuit at an image signal side of said display region for supplying an image signal to said plural first semiconductor elements arranged in said display region; and
      - a signal circuit at a scan signal side of said display region for supplying a scan signal to said plural first semiconductor elements.
  12. A liquid crystal display apparatus as claimed in claim 11, wherein
    - the number of driver circuits bonded to said other substrate of said pair of substrates is two, and
    - respective ones of said driver circuits are arranged adjacent to said signal circuit at said image signal side and at said scan signal side of said display region, respectively.
  13. A liquid crystal display apparatus as claimed in claim 1, wherein
    - the diagonal length of said display region is in a range from 75 mm to 175 mm; and
    - the distance from the outer periphery of the display region to the outer periphery of the liquid crystal display apparatus is at most 5 mm.
  14. A liquid crystal display apparatus as claimed in claim 1, wherein
    - the ratio of the area of said display region to the area of said one substrate of said pair of substrates is in a range from 70% to 95%.
  15. A liquid crystal display apparatus as claimed in claim 1, wherein

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the distance between said driver circuit and said peripheral circuit region is at most 1 mm.

16. A liquid crystal display apparatus as claimed in claim 1, wherein
  - a light-shield film is formed on said peripheral circuit region.
17. A liquid crystal display apparatus as claimed in claim 1, wherein
  - a driver circuit is provided at only a short side of said one substrate of said pair of substrates.
18. A liquid crystal display apparatus as claimed in claim 1, wherein
  - a driver circuit is provided at only a long side of said one substrate of said pair of substrates.
19. A liquid crystal display apparatus as claimed in claim 1, wherein
  - a threshold voltage of said liquid crystal layer is at most 2 V.
20. A liquid crystal display apparatus as claimed in claim 1, wherein
  - the active region of said first and second semiconductor elements are made of amorphous silicon and polycrystalline silicon; and
  - the active region of said semiconductor elements comprising said driver circuit is made of single crystalline silicon.
21. A liquid crystal display apparatus according to claim 1, wherein another part of said peripheral circuits is arranged

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in said driver integrated circuit region which is not held between said pair of substrates.

22. A liquid crystal display apparatus comprising:
  - a pair of substrates, at least one of which is transparent;
  - a liquid crystal layer formed by enclosing a liquid crystal composition between said pair of substrates;
  - a display region, having a plurality of first semiconductor elements which are arranged in a matrix is formed on one substrate;
  - a peripheral circuits region having a plurality of second semiconductor elements for driving said plurality of first semiconductor elements, arranged at a periphery of said display region, are formed on said one substrate of said pair of substrates;
  - at least one driver circuit for driving said peripheral circuits bonded at a designated region on said one substrate of said pair of substrates;
 wherein said first and second semiconductor elements are thin film transistors; and
  - the thin film transistors at said display region have a switching time in a range from 30  $\mu$ s to 60  $\mu$ s;
  - the thin film transistors at said peripheral circuit region have a switching time in a range of 3  $\mu$ s to 12  $\mu$ s; and
  - said driver circuit has a transistor having a switching time in a range from 0.01  $\mu$ s to 0.03  $\mu$ s.

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25. A liquid crystal display apparatus according to claim 23, wherein said display region having said plurality of first semiconductor elements has at least one semiconductor island annealed by laser irradiation.

Year	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100
1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100	

31. A liquid crystal display apparatus according to claim 28, wherein said plurality of second semiconductor elements are thin-film transistors, and said thin-film transistors have a mobility in the range of 100 cm<sup>2</sup>/Vs to 300 cm<sup>2</sup>/Vs.

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32. A liquid crystal display apparatus comprising:  
a pair of substrates, at least one of which is  
transparent;  
a liquid crystal layer formed by sandwiching a liquid  
crystal composition between said pair of substrates;  
a display region having a plurality of semiconductor  
elements arranged in a matrix on one substrate of said pair of  
substrates;  
an image signal peripheral circuit which consists of a  
switch matrix connected to said display region on one  
substrate of said pair of substrates; and  
at least one driver circuit electrically connected to  
said image signal peripheral circuit.

33. A liquid crystal display apparatus according to  
claim 32, wherein a scanning signal peripheral circuit is  
connected to said display region and is formed on one  
substrate of said pair of substrates.

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34. A liquid crystal display apparatus according to  
claim 32, wherein at least one of said image signal peripheral  
circuit and said scanning signal, the peripheral circuit  
includes a plurality of semiconductor elements having at least  
one semiconductor island annealed laser irradiation.

35. A liquid crystal display apparatus according to  
claim 34, wherein the laser irradiation is excimer laser  
irradiation.

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39. A liquid crystal display apparatus according to claim 38, wherein said at least one image signal peripheral circuit includes a plurality of semiconductor elements having at least one semiconductor island annealed by laser irradiation.

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wherein only one driver circuit is electrically connected to said image signal peripheral circuit for generating clock pulses and analog image signals.

44. A liquid crystal display apparatus according to claim 43, wherein the laser irradiation is provided by an

excimer laser.

45. A liquid crystal display apparatus according to  
claim 44, wherein said excimer laser is a XeCl excimer laser.

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